

ORION connection helps create one of world's top supercomputers



An agreement between ORION and the Shared Hierarchical Academic Research Computing Network (SHARCNET) has created one of the world's most powerful supercomputers.

Announced at SHARCNET's recent Annual General Meeting in Guelph, the agreement provides SHARCNET with a dedicated one-gigabit per second segment on the ORION network, linking SHARCNET's three main computational sites at the University of Western Ontario in London, the University of Guelph and McMaster University in Hamilton.

It also represents ORION's first research project. ORION's high-speed connectivity gives the computational facilities at these sites the com-

bined processing power of over one Teraflop, or one trillion "floating operations per second", an internationally-recognized measure of processing power used by the Top500 Supercomputer Sites (Top500.org) to track the world's most powerful computer installations.

represent one of Canada's most powerful HPC sites.

The most recent TOP500 List was announced on June 24 during the International Supercomputer Conference in Heidelberg, showing 59 HPC systems worldwide are able to exceed the 1-teraflop mark.

SHARCNET is currently conducting benchmarking tests to establish its official ranking for the Top500's bi-annual update in November 2003.

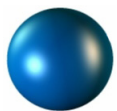
"This connection provides SHARCNET researchers with greater access to distributed computational resources, more opportunities for collaboration between institutions and the ability to undertake more computationally-intensive

(Continued on page 2)

SHARCNET links several institutions in Southwest Ontario

SHARCNET's capacity would currently be ranked among the top 60 sites in the world and

Welcome to our first issue



Welcome to the first issue of the ORION Research and Discovery News. Here you will find a mix of brief news items about advanced networking in Ontario as well as research and education activities on the ORION network and other items of interest in the field of research, scientific innovation and collaboration in Ontario and abroad.

We will also occasionally profile individuals and projects from the ORION-user community. We welcome your comments and story ideas.

Please feel free to share this newsletter with colleagues or anyone you believe would be interested in receiving it.

Discover in this issue:

- **ORION connection helps create one of world 's top supercomputers**

- **Next generation video conferencing to address the human factor**

- **\$78 million optical network nearing completion**

- **Local loop and connectivity upgrades on track**

- **ORION set to dramatically increase the pace of forestry research**

The ORION Research and Discovery News is a monthly electronic publication providing news and information of interest to users of the Ontario Research and Innovation Optical Network and to the worldwide research and education community.



Next generation video conferencing to address the human factor



Next-generation video-conferencing and collaborative technologies will need to be more intuitive and people-friendly before they are adopted widely and reach their potential, participants at a recent national workshop were told.

Co-hosted by ORION, York University, and CANARIE, the event was designed to help define funding and research objectives for the next Advanced Network Applications, Services and Technologies (ANAST) program under CANARIE's CA*net 4 initiative.

Over 60 people from throughout the country participated in the York University workshop, some from distant locations in Ottawa, Calgary and Burnaby, B.C. For participants, the event was a rare opportunity to share and learn about other organizations' experience with video conferencing and to establish contacts for future collaboration.

Although access grids, collaborative workspace environments and better ways of sharing and accessing data were all among the several topics addressed at the workshop, it was clear that for many people and organizations, video conferencing still represents a technology barrier and it is important to move the technology beyond the "talking heads" experience.

Part of the challenge is to make the experience more intuitive and responsive to the way humans normally interact when they are face-to-face and when they work together.

"There's no reason why Ontario and Canada can't be a world-leader in this field."

"The workshop will help us define the central support services and facilities that CA*net 4 should provide to enable more effective use of video conferencing and other collaborative technologies," says Peter Marshall, CANARIE's Director of Network Applications.

Ultimately, the workshop will lead to a series of recommendations on topics in the research and development of next generation video conferencing and network-based collaborative tools that CANARIE should fund as part of the CA*net 4 advanced applications and research program.

The funding timeframe will likely be from January 2004 through March 2007 during which from eight to 20 million dollars will be made available, depending on indications of interest through the workshop process and the number of funding requests.

Marshall, who is leading part of the funding and program definition process for CANARIE, anticipates that new program guidelines may be released as early as this fall. For Phil Baker, President and CEO of ORANO, ORION's advanced optical high-speed capability will help accelerate the use and adoption of advanced video conferencing and technology in Ontario.

"Users of the network will be in a much better position to develop solid proposals to access CA*net 4 and CANARIE funding," he said. "There's no reason why Ontario and Canada can't be a world-leader in this field. Having a multi-gigabit optical infrastructure like ORION that reaches out to 21 cities throughout Ontario certainly gives the province a distinct advantage in expanding the use of these new technologies. For many organizations, the rewards can be enormous and ORION is keen on playing a leading role to make it happen," he said.

Marshall expects to share a draft of the new program design and guidelines with workshop participants by the end of July and that the funding program will be announced in the fall.

To find out more about the discussions, and to view presentations and video of the May 23 seminar, visit the workshop web site at <http://www.orion.on.ca/vcworkshop/index.htm>.

ORION connection helps create one of world's top supercomputers ...

(continued from previous page)

research of benefit to Ontario," said Carmen Gicante, SHARCNET's Executive Director.

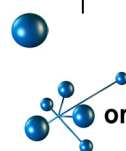
"This partnership is the first of many innovative research projects that ORION will now make possible throughout Ontario," said Phil Baker, President and CEO of ORANO, which owns and operates the ORION network.

Distributed computing, a primary focus of SHARCNET, is based on the principle that applications requiring a large amount of computing power can be distributed across available processors to optimize time and efficiency.

For example, if a SHARCNET researcher at McMaster required 64 processors to run a certain application, and only 32 were available, the computation could be distributed, via the ORION network, to available processors at Guelph and Western.

Leading-edge research that SHARCNET is now supporting ranges from high precision theory of fundamental atomic systems to photonics and the design and simulations of semi-conductor lasers.

As part of this strategic partnership, SHARCNET and ORION will collaborate to provide the opportunity for researchers and staff within both organizations to gain knowledge and experience in the testing, development and management of an advanced optical-based R&D network.



\$78 million optical network nearing completion



When primary segments of the new \$78 million ORION network became operational last month, no one was more satisfied than ORION's Project Director Sam Mokbel and his team of engineers.

As of July 24, the Toronto-Thunder Bay, Ottawa-Toronto-London, and the Toronto-Hamilton segments were completed. The Windsor-Toronto segment will be completed by the week of July 28.

While there are some segments of the network yet to be lit, advanced optical and routing gear has been installed and successfully tested at 15 of ORION's 22 PoP (Point of Presence) locations, from Windsor to Thunder Bay, and from Ottawa to Welland - a huge engineering and logistical undertaking.

The network is among the largest and most powerful fully-owned and operated Research and Education (R&E) networks in the world, involving a pair of optical fibres extending 8,200 kilometres and over 50 PoP and co-location sites spanning 3,700 kilometres.

Work began in October of last year, and the very first connection was completed and tested between Laurentian University, in Sudbury and York University's main campus at Downsview on February 7, 2003.

"That was a very important day for us," says Mokbel. Few have ever tried to complete a network of this size and scope in this amount of time," he said. "You could say that was the day our baby was born," he said.

"Our original Business Plan did not anticipate full operation of the network across Ontario until 2004," said Baker.

"I am glad to say that the network is now operational in several key segments and we expect the final segments to be connected by August. I must really commend our engineering team and our partners at Bell

Canada, Hydro One Telecom and Nortel Networks for being able to achieve so much, in so little time," he said.

"Our biggest priority now is to get as many organizations signed up and accessing the network as soon as possible, to take full advantage of the network's advanced capabilities."

It is expected that up to 25 organizations will be connected and accessing the ORION network by September and up to 40 by the end of December. ORANO's target is to connect 100 user institutions by the end of 2004.

The Ontario Ministry of Enterprise, Opportunity and Innovation and Ontario's SuperBuild Corporation are ORION's primary funding partner, with an investment of \$32.3 million. The federal government has invested \$3.4 million through CANARIE, Canada's Advanced Internet Development Organization, which operates CA*net4.

Additional private and public sector investments over the next three years will bring the value of the ORION project to over \$78 million.

To learn more about the people behind ORION, visit the ORION Team Profile page on the ORION web site.



Local loop and connectivity upgrades on track



State-of-the-art optical and routing gear is already installed and operational in several Ontario cities only weeks after announcing an

investment of \$5.8 million in local loop and connectivity upgrade funding to several ORION user organizations.

High-end gear is already installed and operational for local loop connectivity at MacMaster University in Hamilton, Lakehead University and Confederation College in Thunder Bay and Laurentian University in Sudbury.

London's LARG*net equipment is installed and operational and is ready to connect five institutions, including the University of Western Ontario, Fanshawe College, London Health Science, St. Joseph's Health Care and the John P. Robarts Research Institute.

The work is proceeding thanks to an investment of \$5.8 million in funding by the

Ontario Government and Optical Regional Advanced Network of Ontario (ORANO) to post-secondary and research institutions to allow them to connect to the ORION network.

The funding, part of SuperBuild Corporation's \$32.3 million investment in the ORION project, goes towards equipment upgrade and connectivity projects that will enable institutions and organizations to connect to the network.

Announced on April 28, 2003 by Ontario's Associate Minister of Enterprise, Opportunity and Innovation David Turnbull and ORANO Board Chair Dr. Ross Paul, the contribution will leverage total investment of \$14.4 million.

"The ORION network builds on this government's goals by ensuring the province remains at the forefront of global research and scientific and medical discoveries," said Turnbull.

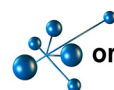
"It will also optimize Ontario's current investment in R&D infrastructure, strengthening

this province's research capacity in areas such as engineering, technology and medicine. This is an important step in connecting Ontario's leading research and education institutions locally and internationally, so they can participate in innovative global research projects."

By bringing us the most advanced optical network infrastructure in Canada, ORION sets the stage for new developments in research and education throughout the Province, said Dr. Ross Paul, Chair of ORANO and President of the University of Windsor.

"Our best researchers, teachers and students will now have the high speed and high powered connections that will allow them to excel in the new digital knowledge economy."

The April 28, 2003 announcement was made at an official "fibre-splicing ceremony" marking the opening of ORANO's new offices in Toronto.



ORION to dramatically increase the pace of forestry research



Creating a balanced ecological approach to forestry management requires increasingly sophisticated methods and tools for obtaining and analysing multiple layers of information and in Thunder Bay a new tool is being tested to make it easier to work through these layers.

At Lakehead University and the Legacy Forest Project, the ORION network is expected to dramatically increase the pace of research in this critical field.

The Legacy Forest Project involves 1,000,000 hectares of forest land in Northwestern Ontario that is being put under a microscope to study the long-term impact of commercial forestry and intensive logging activity.

Although a section of the forest is being used for commercial timber management, the land represents the convergence of three major ecosystems, the confluence of three major climate systems, the headwaters of three continental watersheds, and the continental north-south divide.

Geographic Information Systems (GIS) laboratories, such as the one at Lakehead, rely on access to layers of raw data, including LANDSAT (Land Remote-Sensing Satellite) colour-infrared images and high-resolution digital aerial photographs, to monitor and study millions of acres of forest.

Just one of these aerial images represents 350 megabytes of data. Lakehead has compiled over 150 gigabits of images for the Legacy Forest Project intended to provide a "one-stop shopping" data warehouse for researchers and requires maximum bandwidth to be fully functional.

"For researchers in different locations, collaborating on the analysis of images currently means having to burn data onto CDs and courier them to their destination.

It can take hours, or even a whole day, to get feedback," says Ulf Runesson, Associate Professor, Lakehead University Faculty of Forestry and the Forest Environment and director of the Legacy Forest Project's Data Warehouse, Image Archive, Quetico Inventory and Website.

"ORION will make it possible to access and analyse these images at light speed," adds Runesson. "It will allow users of the warehouse to effortlessly browse satellite and aerial photographs online at or near original data resolutions."

With the instant access to these images that ORION will provide, the pace of research will increase dramatically, as will the range and scope of forestry management access by institutions across the province and beyond. ORION will also enable real time spatial analysis online for customized map production and queries.

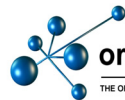
"ORION will make it possible to access and analyse these images at light speed."

- Ulf Runesson

"Once fully established, the Legacy Forest will form an ideal base for investigating the effects of forest management on sustainability from the point of view of all forest values" said Robin Reilly, Chair of the Legacy Forest Education and Technology Transfer Committee.

"The Legacy Forest will greatly enhance educational programs at public schools, universities, and colleges. It will also be ideal for providing a unique continuing education experience for forestry practitioners, other forest users, and the public-at-large."

Reilly adds that ORION will contribute to the economic development of Northwestern Ontario and potentially serve as a model for intensive forest management at the provincial, national, and possibly even international level.



orion research and discovery news

THE OFFICIAL NEWSLETTER OF THE ONTARIO RESEARCH AND INNOVATION OPTICAL NETWORK

ORION is an advanced high-speed fibre optic network that connects research and education institutions to each other and to colleagues around the world.

Spanning 3,700-kilometre to 21 cities throughout the Province of Ontario, ORION was created to bring leading-edge network capability to Ontario's publicly funded R&E community and to become a catalyst for creative and innovative next generation Internet applications.

ORION is owned and operated by the Optical Regional Advanced Network of Ontario (ORANO).

For more information, visit our web site at <http://www.orion.on.ca>. Communicate directly with the Editor of the ORION Newsletter at info@orano.on.ca.

To subscribe to the electronic version of this newsletter, visit this web site. <http://www.orano.on.ca/newsletter/subscribe.html>

